



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,331	09/17/2003	Hong Shih	P1130/LMRX-P023	8374
32986	7590	04/17/2009	EXAMINER	
IPSG, P.C. P.O. BOX 700640 SAN JOSE, CA 95170			BLAN, NICOLE R	
			ART UNIT	PAPER NUMBER
			1792	
			MAIL DATE	DELIVERY MODE
			04/17/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/666,331	Applicant(s) SHIH ET AL.	
	Examiner NICOLE BLAN	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,6-8,15-21,23-33,38-44 and 46-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4, 6-8, 15-21, 23-33, 38-44 and 46-54 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>03092009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The amendments to claims 1, 7, 8, 15, 21, 26-30, 38-40, 44, 46, 50 and 54 as well as the cancellation of claim 2 filed on January 23, 2009 have been acknowledged. Claims 34-37 and 55-58 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on December 7, 2006. Currently claims 1, 4, 6-8, 15-21, 23-33, 38-44 and 46-54 are pending.

Response to Arguments

2. Applicant's arguments filed January 23, 2009 have been fully considered but they are not persuasive.

3. In response to applicant's arguments regarding the combination of Shih, Han and Crevasse over amended claim 1, the Examiner does not find them persuasive. Shih teaches the chemical steps as listed in the order required by claim 1 (see detailed discussion below). To focus on the newly amended limitations, Shih also teaches that chemical steps after step 140 (a deionized water rinse) may further include or be replaced with the other chemical steps depending on the nature of contaminants to be removed, such as one or more acid cleaning steps [page 5, paragraph 33]. Therefore, '870 teaches adding a first acid cleaning step for a third period [Fig. 3, page 5, paragraph 33]. It would have been obvious to rinse the surface with deionized water and dry it with filtered nitrogen in order to prevent cross contamination as well as to produce an extra clean structure. '870 also teaches cleaning with a second set of acids for a fourth period [page 5, paragraph 33]. In paragraph 33 of '870, it is taught that any one of the

Art Unit: 1792

multiple acid solutions listed could be chosen. The solutions listed may be considered strong acids, but if one of the solutions is weaker than the rest; thus, the second set of acids will be weaker than the previous one. Additionally, '870 teaches exposing structures to a fifth solution including a first set of alkalines for a fifth period [NH_4OH ; page 2, paragraph 15]. They indicate that treatment with NH_4OH may be useful in removing metal contaminants [page 2, paragraph 15].

Han is relied upon for its teaching that it is conventionally known to coat chambers using yttrium oxide. Crevasse is relied upon for its teaching that it is conventionally known to mechanically rub a surface using an acid in order to remove residual debris from the surface.

Additionally, the use of the translational phrase "comprising", which according to MPEP 2111.03, is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. See *Genentech, Inc. v. Chiton Corp.*, 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997). Therefore, the combination of references renders the claim obvious because the claim does not exclude additional elements.

Thus, the art meets the current claimed limitations because the steps occur in the order required by the limitations set forth in claim 1.

4. In response to applicant's argument regarding the criticality of the use of "thereafter" language, the Examiner does not find this convincing because there is no demonstration that a different result is produced in the instant application compared to the cited prior art. Furthermore, unexpected results have not been produced.

Art Unit: 1792

Claim Objections

5. According to 37 C.F.R. 1.121, no claim text shall be presented for any claim in the claim listing with the status of “canceled” or “not entered.” Please remove all text present in the currently cancelled claims.

Claim Objections

6. Claims 23-25 are objected to because of the following informalities: They depend from cancel claimed 22. The Examiner has interpreted the claims to depend from claim 21 which has corresponding subject matter. Appropriate correction is required.

7.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Art Unit: 1792

10. Claims 1, 4, 6, 7, 15-21, 23-33, 38, 39, 44 and 46-54 are rejected under 35

U.S.C. 103(a) as being unpatentable over Shih et al. (U.S. PGPub 2003/0190870, hereafter ‘870), in view of Han et al. (U.S. PGPub 2003/0127049, hereafter ‘049), and further in view of Crevasse et al. (U.S. PGPub 2002/0139393, hereafter ‘393).

Claim 1: ‘870 teaches cleaning ceramic surfaces of parts used in semiconductor processing equipment [abstract] by exposing a set of structures in a first solution including an oxidizer for a first period [Fig. 3, H₂O₂; page 5, paragraph 32], removing the set of structures from the first solution [going from one solution to the next; Fig. 3, page 5, paragraph 32], exposing the set of structures to a second solution including a ketone reagent for a second period [acetone; Fig. 3, page 5, paragraph 32], removing the set of structures from the second solution [going from one solution to the next; Fig. 3, page 5, paragraph 33], rinsing the set of structures with de-ionized water [(140), Fig. 3]. ‘870 also teaches that it is commonly known to expose the structure to a stream of nitrogen after rinsing so that it blows off excess water [page 5, paragraph 34, lines 22-29]. It would have been obvious to one of ordinary skill in the art to remove excess water by exposing the structure to a stream of nitrogen after rinsing with de-ionized water in order to remove the excess water.

‘870 indicates that chemical steps after step 140 may further include or be replaced with the other chemical steps depending on the nature of contaminants to be removed, such as one or more acid cleaning steps [page 5, paragraph 33]. Therefore, ‘870 teaches adding a first acid cleaning step for a third period [Fig. 3, page 5, paragraph 33]. It would have been obvious to rinse the surface with deionized water and dry it with filtered nitrogen in order to prevent cross contamination as well as to produce an extra clean structure. ‘870 also teaches cleaning with a

Art Unit: 1792

second set of acids for a fourth period [page 5, paragraph 33]. In paragraph 33 of '870, it is taught that any one of the multiple acid solutions listed could be chosen. The solutions listed may be considered strong acids, but if one of the solutions is weaker than the rest; thus, the second set of acids will be weaker than the previous one. Additionally, '870 teaches exposing structures to a fifth solution including a first set of alkalines for a fifth period [NH_4OH ; page 2, paragraph 15]. They indicate that treatment with NH_4OH may be useful in removing metal contaminants [page 2, paragraph 15].

'870 does not specifically indicate that ceramic surfaces include yttrium oxide with aluminum chloride particles, as recited in the preamble of the instant claim 1. It is noted that chamber parts are conventionally covered with ceramic coating of yttrium oxide in order to better protect the chamber parts from corrosion and that the residues to be removed are aluminum chloride, as evidenced by '049 [page 1, paragraph 2, lines 8-12 and paragraph 4, lines 1-9]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the yttrium oxide coated ceramic parts taught by '049 as the parts to be cleaned by '870 with a reasonable expectation of success because '049 teaches that yttrium oxide coating protects the parts from corrosion.

'870 and '049 remain silent with respect to mechanically rubbing a surface of the part while treating it with a first set of acids. However, scrubbing or wiping or rubbing surfaces during wet cleaning is conventionally utilized in the art, as indicated by '393, who teaches cleaning the surfaces of substrates with a brush [i.e. scrubbing] [page 1, paragraphs 4-5]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the cleaning techniques taught by '393 in combination with the solutions taught by

Art Unit: 1792

‘870 with a reasonable expectation of success because ‘393 teaches that brushes are an effective way to remove any residual debris on the substrate.

Claim 4: ‘870, ‘049, and ‘393 teach the limitations of claim 1 above. ‘870 teaches that the first set of acids includes HF, HNO₃, and H₂O [page 2, paragraph 16; page 5, paragraph 33].

Claims 6 and 15-20: ‘870, ‘049, and ‘393 teach the limitations of claim 1 above. ‘870 teaches rinsing parts with DI water and drying with filtered nitrogen upon cleaning with particular chemicals is know to those of ordinary skill in the art [Figs. 2-3; page 5, paragraph 34, lines 22-29].

Claim 7: ‘870, ‘049, and ‘393 teach the limitations of claim 1 above. ‘870 discloses that ultrasonically enhanced cleaning/rinsing is conventional in the art and one skilled in the art would have found it obvious to enhance the cleaning of the parts by applying ultrasonic waves to the acetone containing solution of ‘870 [page 5, paragraph 34, lines 11-13].

Claim 21: ‘870, ‘049, and ‘393 teach the limitations of claim 1 above. ‘870 teaches that the first solution contains an oxidizer [H₂O₂, page 2, paragraph 15; page 5, paragraph 32].

Claims 23-25: ‘870, ‘049, and ‘393 teach the limitations of claim 21 above. ‘870 teaches that H₂O₂ comprises about 30% of the solution [page 5, paragraph 32, lines 13-20].

Art Unit: 1792

Claims 26, 28, 44, and 54: '870, '049, and '393 teach the limitations of claim 1 above. '870 does not explicitly disclose the time in which the structures are in contact with the first, second, fourth, or fifth solution, but it does teach on page 2, paragraph 15, lines 17-20 that the length of time the structures are left in contact with the solution may be determined routinely by one of ordinary skill in the art without undue experimentation. It is within the skill of an ordinary artisan to vary the time of cleaning based on the thickness of the deposits or contaminants to be removed from the surface. It is commonly known that the thicker the residue is, the longer it takes to clean it. The length of time is also impacted by the strength of the solution, the stronger the solution, the less amount of time it would take to clean than using a weaker solution. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the time the solution remained in contact with the structures, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 27: '870, '049, and '393 teach the limitations of claim 1 above. '870 teaches that the ketone reagent comprises acetone [page 5, paragraph 32].

Claim 29: '870, '049, and '393 teach the limitations of claim 1 above. '870 teaches the use of acidic solution in combination with H₂O₂ [pages 4-5, paragraphs 31 and 33] and that the processing steps can be replaced. Therefore, the presence of H₂O₂ in the first set of acids or in the third cleaning solution, as recited, is expected with in the teaching of '870.

Art Unit: 1792

Claim 30: '870, '049, and '393 teach the limitations of claim 1 above. '870 teaches that the first set of acids comprises HF [page 2, paragraph 16; page 5, paragraph 33].

Claims 31-33: '870, '049, and '393 teach the limitations of claim 30 above. '870 does not explicitly disclose the concentration of the first set of acids in the third solution, but it does teach on page 2, paragraph 16 that the relative amounts of HF may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the concentration of the solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 38: '870, '049, and '393 teach the limitations of claim 1 above. '870 does not explicitly disclose the time in which the structures are in contact with the third solution, but it does teach on page 2, paragraph 16, lines 10-12 that the length of time the structures are left in contact with the solution may be determined routinely by one of ordinary skill in the art without undue experimentation. It is within the skill of an ordinary artisan to vary the time of cleaning based on the thickness of the deposits or contaminants to be removed from the surface. It is commonly known that the thicker the residue is, the longer it takes to clean it. The length of time is also impacted by the strength of the solution, the stronger the solution, the less amount of time it would take to clean than using a weaker solution. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the time the

Art Unit: 1792

solution remained in contact with the structures, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claim 39: '870, '049, and '393 teach the limitations of claim 1 above. '870 teaches that the third solution comprises H₂O [page 2, paragraph 16, lines 1-4].

Claims 46-49: '870, '049, and '393 teach the limitations of claim 1 above. '870 teaches that the first set of alkalines comprises NH₄OH [page 2, paragraph 15]. '870 does not explicitly disclose the concentration of the first set of acids in the third solution, but it does teach on page 2, paragraph 15 that the relative amounts of NH₄OH may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the concentration of the solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Claims 50-53: '870, '049, and '393 teach the limitations of claim 1 above. '870 teaches that the fifth solution comprises H₂O₂ [page 2, paragraph 15]. '870 does not explicitly disclose the concentration of the first set of acids in the third solution, but it does teach on page 2, paragraph 15 that the relative amounts of H₂O₂ may be determined routinely by one of ordinary skill in the art without undue experimentation. It would have been obvious to one having

Art Unit: 1792

ordinary skill in the art at the time the invention was made to optimize the concentration of the solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

11. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over ‘870, ‘049, and ‘393 as applied to claim 1 above, and further in view of Ssuzuki et al. (U.S. Patent 4,688,918, hereafter ‘918).

Claim 8: ‘870, ‘049, and ‘393 teach the limitations of claim 1 above. They do not explicitly teach exposing the set of structures in a second solution for a second period where the set of structures are rinsed and mechanically rubbed with an alcohol. However, ‘918 teaches that rinsing a solution with an alcohol following a ketone is known [col. 5, lines 41-43]. It would have been obvious to a person of ordinary skill in the art to rinse the structures with alcohol in an attempt to provide an improved cleaning method, as a person with ordinary skill has good reason to pursue the known options within his or her technical grasp. In turn, because rinsing with an alcohol following a ketone as claimed has the properties predicted by the prior art, it would have been obvious to use that method of cleaning. As discussed in claim 1 above, scrubbing or wiping or rubbing surfaces during wet cleaning is conventionally utilized in the art, as indicated by ‘393, who teaches cleaning the surfaces of substrates with a brush [i.e. scrubbing] [page 1, paragraphs 4-5]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the cleaning techniques taught by ‘393 in combination with the

Art Unit: 1792

solutions taught by '870 with a reasonable expectation of success because '393 teaches that brushes are an effective way to remove any residual debris on the substrate.

12. Claims 40-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over '870, '049, and '393 as applied to claim 1 above, and further in view of Amai et al. (U.S. Patent 7,063,094, hereafter '094).

Claims 40-43: '870, '049, and '393 teach the limitations of claim 1 above. '870 teaches the use of HNO_3 in the second set of acids. It remains silent about the use of CH_3COOH in the second set of acids. '094 teaches that foreign substances on the interior surfaces of the chamber can be dissolved by nitric or acetic acid, thus recognizing the equivalency between nitric and acetic acid for similar purposes. However, substitution of equivalent methods requires no express motivation, as long as the prior art recognizes equivalency. *In re Fount*, 213 USPQ 532 (CCPA 1982); *In re Siebentritt*, 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. V. Linde Air Products Co.*, 85 USPQ 328 (USSC 1950). '870 does not explicitly disclose the concentration of the second set of acids, but it does teach on page 2, paragraph 16 that the relative amounts of HNO_3 may be determined routinely by one of ordinary skill in the art without undue experimentation. As '094 taught the equivalency between nitric and acetic acid, it would have been obvious to optimize the concentrations of acetic acid instead of the nitric acid. It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the concentration of the solution, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges

Art Unit: 1792

involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICOLE BLAN whose telephone number is (571)270-1838. The examiner can normally be reached on Monday - Thursday 8-5 and alternating Fridays 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1792

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nicole Blan/
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792